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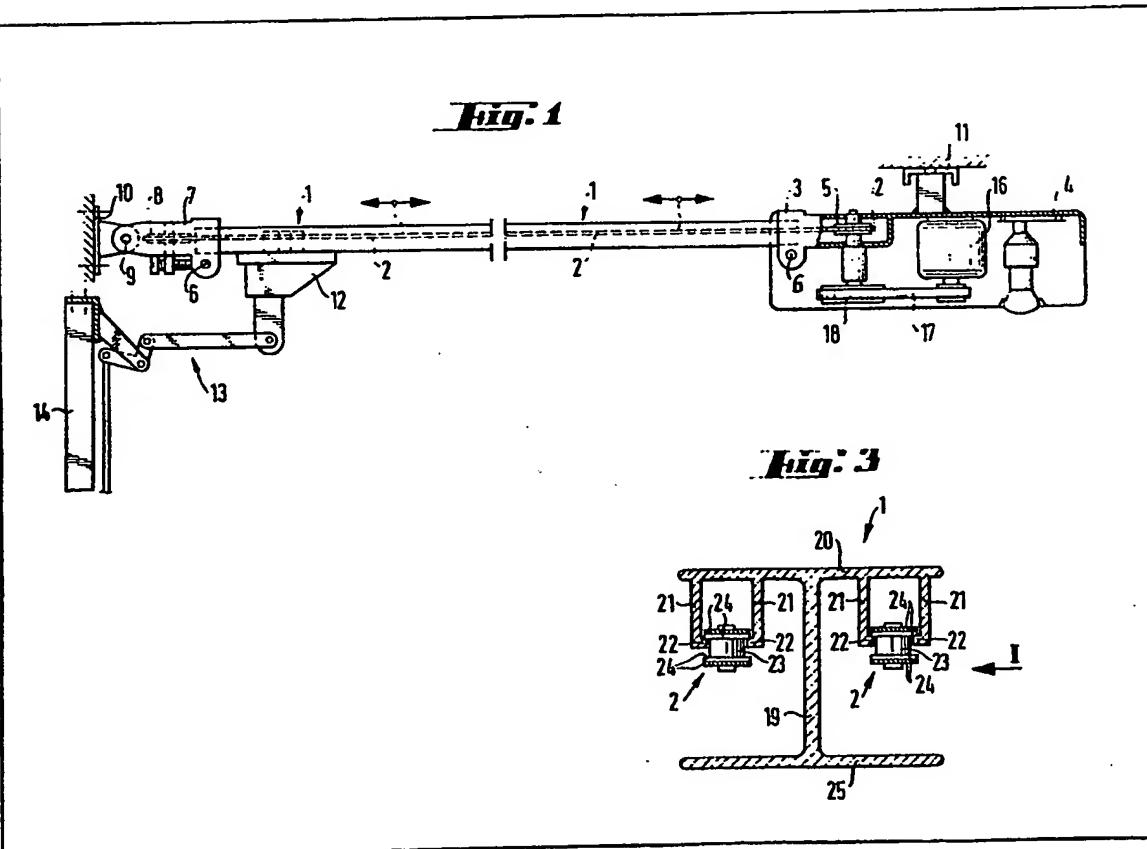
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(54) Supporting lengths of chain in draw chain drives

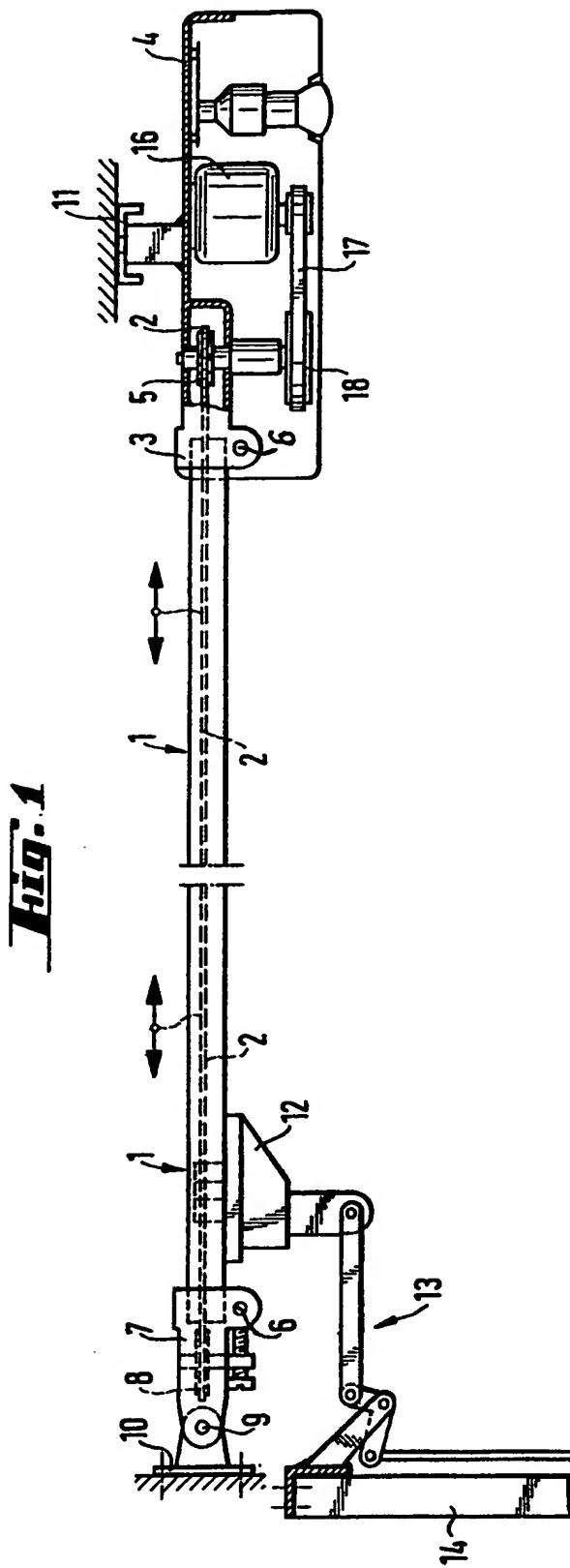
(57) A motor drive arrangement for a
door 14 has a draw chain 2 which is
guided between a drive chain wheel 5

and a guide chain wheel 8, the chain 2
being connected to the door 14 by
way of a draw member 12 movable by
the chain along a mounting rail 1 which
is provided with vertical webs 21
which extend longitudinally of the rail
and have inturned flanges 22 which
form between them gaps for receiving
the pins or rollers 23 of the chain 2.
Above and below the flanges 22,
spaces which are wider than the gaps
receive the side plates 24 of the chain.



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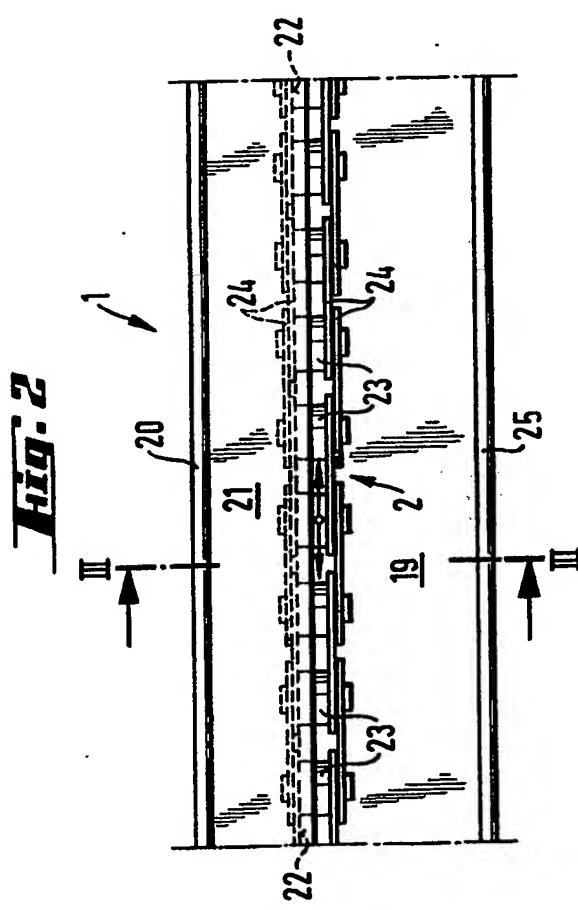
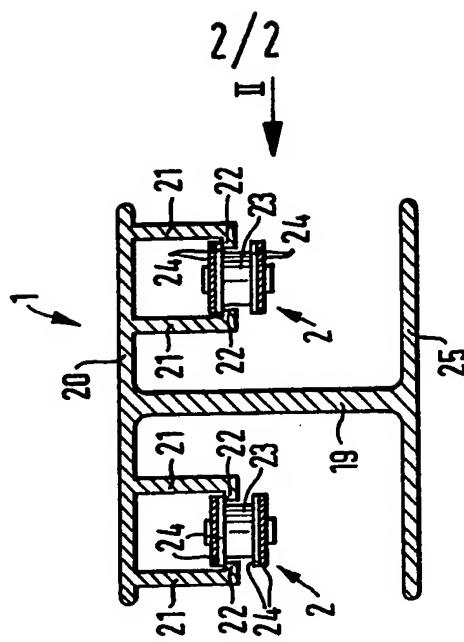


FIG. 3



SPECIFICATION**Improvements in or relating to draw chain drive arrangements**

This invention relates to draw chain drive arrangements.

Draw chain drive arrangements of the kind with which the present invention is concerned are those wherein a draw member which is secured to the chain is guided by means of the chain along a straight path over which the chain has hitherto in principle been guided in a self-supporting manner. The endless chain which, from an ideal point of view, circulates in a horizontal plane, accordingly sags in the axial direction of its links over the quite long conveyor sections outside of the positions at which it is secured to the draw member. In addition, it moves with corresponding ease about its link pivots, transversely with respect to the longitudinal direction of the runs of the chain. In operation, such transverse movements of the chain, which may also be in the form of a swinging motion, may be comparatively severe.

The movements of the chain are not harmful as long as the chain does not strike against another object anywhere and in particular as long as the motion of the chain onto the chain wheels is not detrimentally affected by the movements of the chain. It will be appreciated that it is necessary to reckon on the provision of a relatively large amount of space for the chain to move, in order to ensure that the chain does not strike against another object, with troublesome consequences. In many cases, it is found to be necessary for a switch, for example, a limit switch, to be actuated by means of a switch actuating member which is secured to the chain, in dependence on the conveying position of the chain. If such switch actuation occurs outside the region of the chain wheels, the chain is guided separately in order to be able correctly to carry out the switch actuating operation, over a short distance. Chain guide means of this kind, outside the region of the chain wheels, in the form of slide guide means, are known for example from German utility model No. 78 17 731. The slide guide means used therein are guide members of plastics material, which are restricted to a very short longitudinal region of the chain. Such guide means are installed not only in front of contacts, but also in the run-in region in front of the chain wheels.

The short length of the plastics guide members which engage around the upper side plates of the chain in the manner of clip means are intended to produce the minimum possible amount of friction between the chain and the guide member. More particularly, the guide members must "lift up" the chain which sags down in the rest of the run of the chain, and in particular must carry the forces occurring due to the transverse movements. The normal forces which are thus applied to the guide members are relatively high so that, even with a low coefficient of friction, considerable friction losses still occur.

Mounting the guide members on the mounting

65 rail involves corresponding assembly expenditure, and this applies even when the mounting rail of the known arrangement already has a continuous T-shaped structural portion for fixing the guide members, in order more easily to fit the guide members or to adjust them to the proper position.

70 The present invention seeks to provide a chain guide means in the region between the chain wheels, which is precise and in particular simple, in regard to the expenditure to be involved in that respect, more particularly in connection with assembly thereof.

According to the invention, this is achieved by the subject-matter recited in Claim 1.

The construction of the mounting rail according 80 to the invention provides that the chain is guided virtually along its entire path between the chain wheels around which the chain passes, and the guide means prevents the chain both from sagging under its own weight and also moving

85 transversely in a horizontal plane, and in particular does not permit such movements to escalate into an oscillating motion. This therefore prevents the dynamic forces which are produced by such movements, and thus eliminates frictional forces

90 along the chain. By virtue of the chain being supported at a plurality of positions in the region of each side plate on the guide means, the pressure loadings are low. Even when the guide means is made from the same material as the 95 mounting rail, for example in the form of a one-part hollow shaped member in the form of a preferred embodiment of the mounting rail together with the guide means, the frictional resistance forces which occur are generally low.

100 The guide action is very precise and particularly exact at each point on the run of the chain, whereby in particular there is no need for mounting the guide means at the right position or adjusting the position of the guide means, as was

105 required in the state of the art. The production cost of the guide means is at a particularly low level due to the guide means being formed in one piece with the mounting rail, and, in a preferred embodiment in the form of an extruded member, is even negligibly low.

110 The bar portions which engage between the side plates of the chain and which engage against the rollers thereof may be connected to the rest of the configuration of the mounting rail in many ways. Preferably, the arrangement is such as to ensure that a hollow shaped member is formed over the upper side plates of the chain so that the chain is protected as viewed from above.

115 Further features of the invention are set out in 120 the subsidiary claims, in conjunction with the embodiment about to be described by way of example only, with reference to the accompanying drawings, wherein:—

125 Figure 1 is a side view of a draw chain drive arrangement, including the mounting rail,

Figure 2 is a side view of a longitudinal portion of the mounting rail with a portion of corresponding length of draw chain, and

Figure 3 is a view in cross-section, taken along

lines III—III of Figure 1.

The overall view of the draw chain arrangement shown in Figure 1 illustrates, in a broad breakdown, the mounting rail 1 along which the 5 chain 2 is guided. The mounting rail 1, which comprises an aluminium alloy, is fixed at both ends, at one end by a connecting member 3 forming part of a housing member 4. The housing member 4 rotatably supports a drive pinion 5 for 10 the chain 2. The connecting member 3 is fixed to the housing member 4 by means of clamp screw 6. The other end of the rail 1 is fixed to a connecting member 7 which rotatably supports a direction-changing pinion 8 for the chain 2. The 15 connecting member 7 is connected by way of a pivot arrangement 9 to a wall fixing plate 10 so that there is no need, on installing the arrangement, to achieve precise alignment with respect to the wall fixing means 11 of the housing 20 member 4. Fixed to the chain 2 is a draw member 12 which, by way of a draw assembly generally indicated by reference numeral 13, forms a connection to a movable door member 14. The door member 14 is part of a garage door 25 assembly.

Secured to the housing member 4 is an electric motor 16 which acts on the drive chain wheel 5 by way of a drive belt 17 and a belt pulley 18. Depending on the direction of rotation of the 30 motor 16, the chain 2 is moved by way of the drive chain wheel 5 in one direction or the other. Thus the draw member 12 is moved along the mounting rail 1 in the corresponding direction, whereby the movable door member 14 (of which 35 only part is shown) is lifted out of or lowered into the region of the garage door opening, by way of the draw assembly 13, with actuation of a locking catch linkage which is included in Figure 1.

The side view of the longitudinal portion of the 40 mounting rail 1 shown by Figure 2 and the cross-section through the rail 1 shown by Figure 3 illustrate that an extruded shaped member having the basic configuration of an "I" is selected to form the mounting rail 1. In the position of use, 45 the central web portion 19 of the "I"-shaped member is in a vertical plane. Formed on the underside of the wall portion 20 of the upper flange of the "I"-shaped member, on both sides of the web portion 19 thereof, are two side plate 50 portions 21. Bar portions 22 are formed at the lower ends of the two side plate portions 21, and project therefrom at right angles, more particularly in such a way that the free edges of the bar portions 22 are directed towards each other and 55 define in the longitudinal direction of the mounting rail member, a corresponding gap in which the pins or rollers 23 of the chain 2 are disposed. The gap is of such a size that the rollers 23 of the chain 2 can be guided in a spaced condition therein 60 without however undue transverse movement of the chain.

The side plates 24 of the chain 2 on both sides of the end surfaces of the rollers 23 project beyond the rollers in the direction of the roller 65 diameters, so that they prevent the chain from

sliding out of the gap between the free edges of the bar portions 22, upwardly or downwardly. The side plates 24, which are on the top in the position of use, of the chain 2 which rotates in a horizontal 70 plane in the position of use, lie on the side regions of the edges of the bar portions, so that the chain 2 is carried in such a way that it cannot sag, while the fact that the edges of the bar portions 22 engage the rollers prevents lateral movement and, 75 ensures that for example, a switch actuating member secured to the chain is moved into a correct actuating position within close limits in a three-dimensional mode.

It will be seen that when the above-described 80 elongate "I"-shaped member or extrusion is used, the cost of forming the chain guide means is virtually negligible. By virtue of the chain being guided over virtually the entire length of the run of the chain, the chain is in a precise position 85 everywhere, and accordingly there is no need for a special adjusting operation for chain guide means which have to be mounted individually. In principle, the mounting rail can be produced on its own, and a suitable shaped member for forming 90 the chain run guide means can be mounted thereon, which guide member can then also comprise another material. The preferred form of one-piece manufacture in particular in the form of an extruded member can be manufactured 95 conveniently and in accordance with the purposes involved herein, from an aluminium alloy.

CLAIMS

1. A draw chain drive arrangement, in particular a door drive arrangement, having a drive motor, a chain which is guided over a drive chain wheel driven by the motor, and a chain guide wheel, with a draw member fixed to the chain, and a mounting rail which holds the two chain wheels at a spacing and which is provided with a sliding guide means 100 for the chain in the region of the runs of the chain between the chain wheels, characterised in that, for each run of the chain, the mounting rail has two bar portions which engage between the side plates of the chain towards the pins or rollers of 105 the chain and which are arranged to extend in the longitudinal direction of the run of the chain at least approximately over the entire length thereof, in the region of the mounting rail.
2. A drive arrangement according to Claim 1, 110 characterised in that the bar portions are portions of an elongate shaped member forming the mounting rail.
3. A drive arrangement according to Claim 2, 115 characterised in that the bar portions are formed in such a way as to project perpendicularly on side plate portions which extend vertically in the position of use and which in turn are formed on a horizontally extending wall portion of the mounting rail.
4. A drive arrangement according to Claim 3, 120 characterised in that the mounting rail is of an "I"-shaped configuration with a web portion which extends vertically in the position of use, and that the side plate portions are formed in such a

way as to project into the space between the flange portions of the "I"-shaped member.

5. A drive arrangement according to any one of the preceding claims, characterised in that the

5 mounting rail comprises an aluminium alloy.

6. A draw chain drive arrangement, substantially as hereinbefore described, with reference to the accompanying drawings.